

Scaled data based on original data using  
LM-79-2019 Approved Method: Electrical and Photometric Measurements of Solid-  
State Lighting Products

Test Report Prepared for  
Cooper Lighting Solutions

Brand: STREETWORKS

Report Number: P359510

Luminaire Tested: NVN-SA4B-730-U-SL4

Issue Date: 3/3/2020

**Test Information**

Test Method: LM-79-2019  
Report Number: P359510  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1903-205-24)  
Test Lab: INNOVATION CENTER  
Issue Date: 3/3/2020  
Manufacturer: COOPER LIGHTING SOLUTIONS  
Product Line: STREETWORKS  
Catalog Number: NVN-SA4B-730-U-SL4  
Description: NAVION ROADWAY AND AREA LUMINAIRE  
(4) 70 CRI, 3000K, 800mA LIGHTSQUARES WITH 16 LEDS EACH AND TYPE IV SPILL  
LIGHT ELIMINATOR OPTICS  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 20348 lumens  
Efficiency: N/A  
Efficacy: 119.0 lumens/watt  
Luminous Opening: Rectangular (W 1' x L: 1.5' x H: 0')  
IES Classification: Type IV - Short  
BUG Rating: B2 - U0 - G5

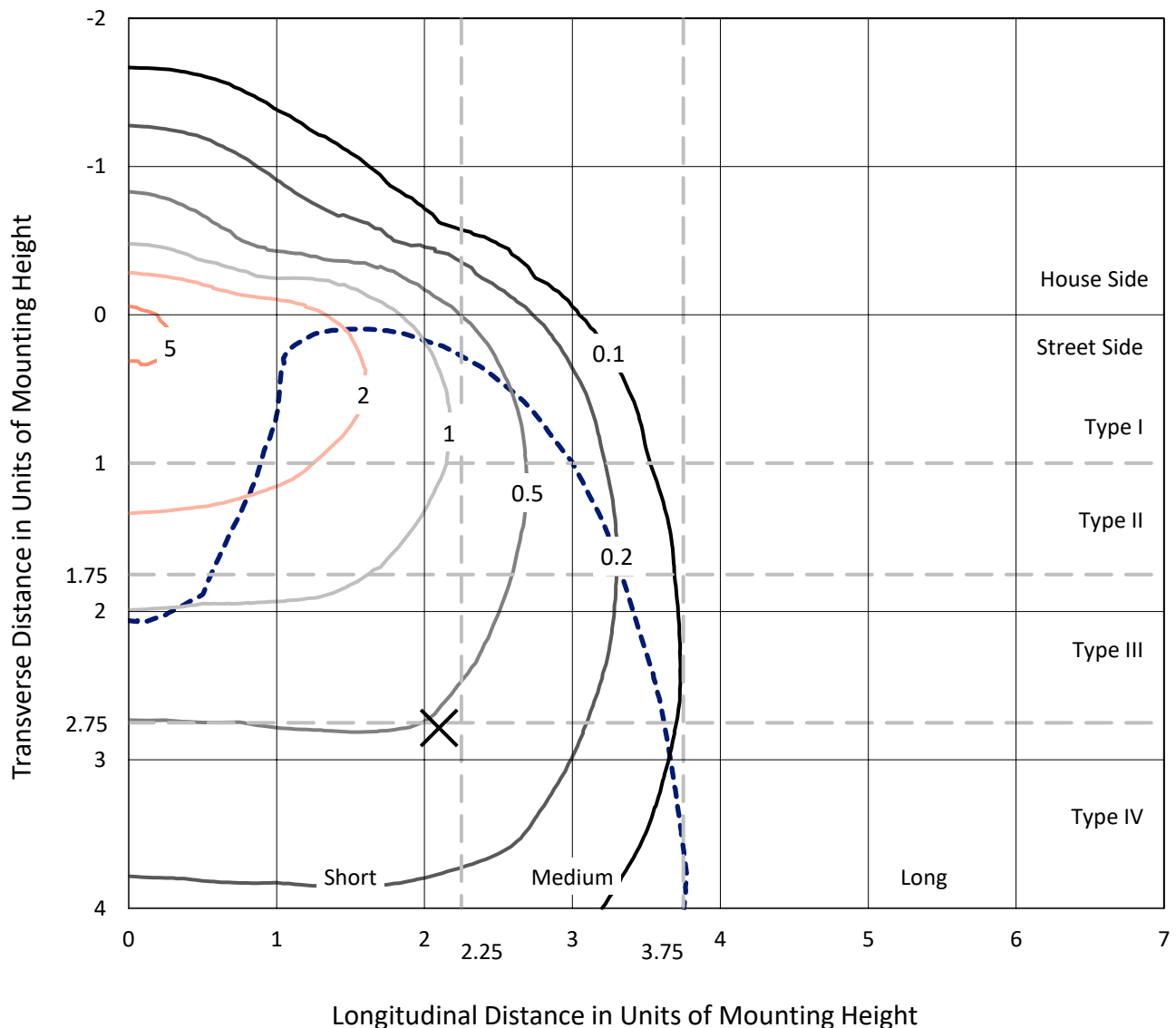
Input Watts (W): 171  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 28.75 FT



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## Iso-Footcandle Lines of Horizontal Illumination

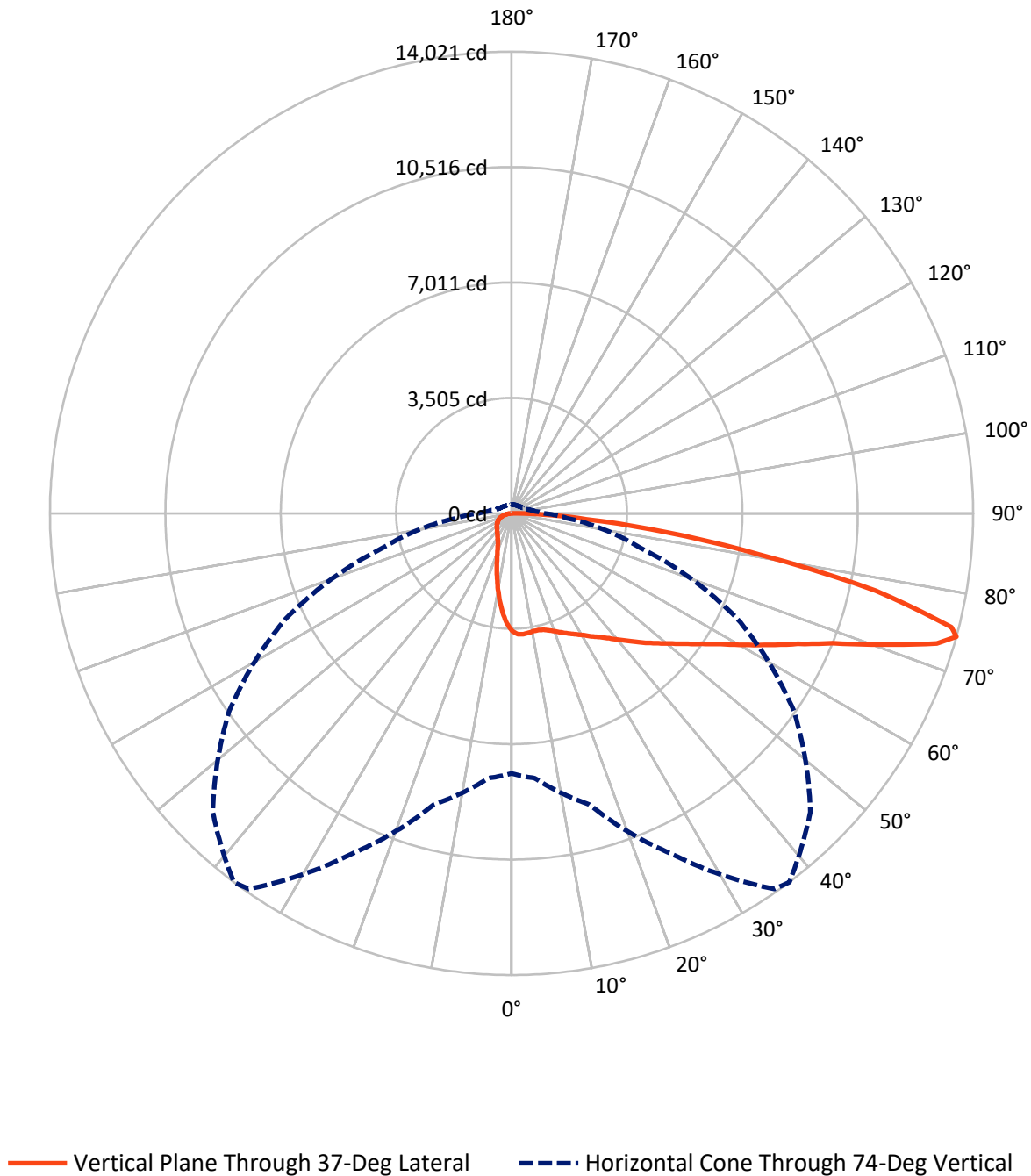
✕ Max cd  
 - - - 1/2 Max cd



Based on 25 foot mounting height. Maximum calculated value = 5.8 fc  
 Type IV - Short - N/A

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## Luminous Intensity Polar Plot



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**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 2799.7   | 0.0    | 2799.7  |
|                    | % Fixture | 13.8     | 0.0    | 13.8    |
| <b>Street Side</b> | Lumens    | 17548.3  | 0.0    | 17548.3 |
|                    | % Fixture | 86.2     | 0.0    | 86.2    |
| <b>Total</b>       | Lumens    | 20348.0  | 0.0    | 20348.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 315.7   | 1.6       |
| 10°-20°   | 809.3   | 4.0       |
| 20°-30°   | 1246.9  | 6.1       |
| 30°-40°   | 1813.2  | 8.9       |
| 40°-50°   | 2668.8  | 13.1      |
| 50°-60°   | 3747.8  | 18.4      |
| 60°-70°   | 4743.6  | 23.3      |
| 70°-80°   | 4176.9  | 20.5      |
| 80°-90°   | 825.9   | 4.1       |
| 90°-100°  | 0.0     | 0.0       |
| 100°-110° | 0.0     | 0.0       |
| 110°-120° | 0.0     | 0.0       |
| 120°-130° | 0.0     | 0.0       |
| 130°-140° | 0.0     | 0.0       |
| 140°-150° | 0.0     | 0.0       |
| 150°-160° | 0.0     | 0.0       |
| 160°-170° | 0.0     | 0.0       |
| 170°-180° | 0.0     | 0.0       |
| 0°-90°    | 20348.0 | 100.0     |
| 0°-180°   | 20348.0 | 100.0     |

**Coefficient of Utilization**



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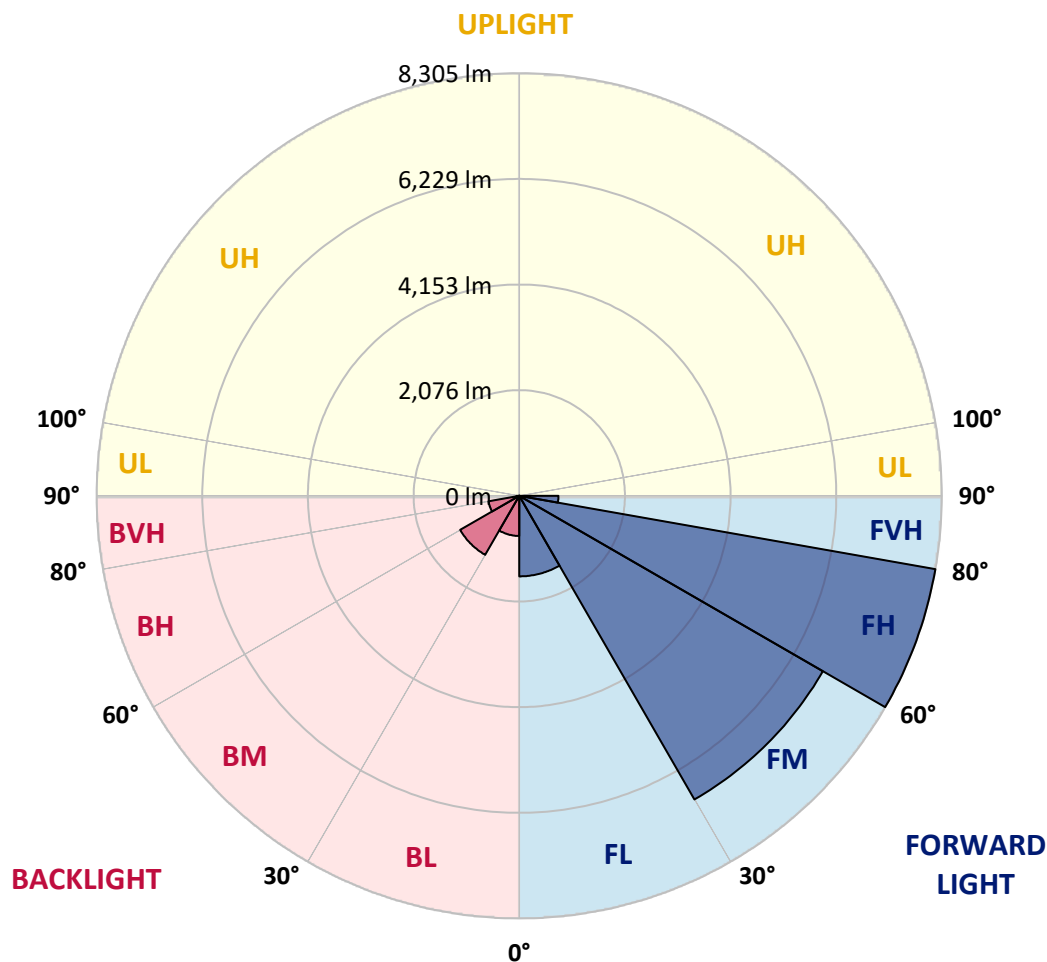
CATALOG NUMBER: NVN-SA4B-730-U-SL4

**LUMINAIRE CLASSIFICATION SYSTEM LUMEN TABLE AND BUG RATING:**

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |          |
|------|-------------|--------|-----------|-------------------------|------|----------|
|      |             |        |           | B                       | U    | G        |
| FL   | (0°-30°)    | 1583.3 | 7.8       |                         |      |          |
| FM   | (30°-60°)   | 6890.0 | 33.9      |                         |      |          |
| FH   | (60°-80°)   | 8305.0 | 40.8      |                         |      | G4/12000 |
| FVH  | (80°-90°)   | 769.9  | 3.8       |                         |      | G5       |
| BL   | (0°-30°)    | 788.6  | 3.9       | B2/1000                 |      |          |
| BM   | (30°-60°)   | 1339.8 | 6.6       | B2/2500                 |      |          |
| BH   | (60°-80°)   | 615.4  | 3.0       | B2/1000                 |      | G2/1000  |
| BVH  | (80°-90°)   | 55.9   | 0.3       |                         |      | G1/100   |
| UL   | (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |          |
| UH   | (100°-180°) | 0.0    | 0.0       |                         | U0/0 |          |

**BUG Rating: B2-U0-G5**

Type IV Short





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**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°     | 35°     | 37°     | 45°     | 55°     | 65°     | 75°    | 85°    |
|-------|--------|--------|--------|---------|---------|---------|---------|---------|---------|--------|--------|
| 0°    | 3585.2 | 3585.2 | 3585.2 | 3585.2  | 3585.2  | 3585.2  | 3585.2  | 3585.2  | 3585.2  | 3585.2 | 3585.2 |
| 2.5°  | 3707.8 | 3708.5 | 3707.8 | 3702.1  | 3688.5  | 3677.0  | 3667.7  | 3654.0  | 3623.9  | 3601.0 | 3566.6 |
| 5°    | 3742.9 | 3738.6 | 3735.8 | 3725.0  | 3703.5  | 3690.6  | 3672.7  | 3646.9  | 3597.4  | 3551.6 | 3495.6 |
| 7.5°  | 3726.4 | 3721.4 | 3715.0 | 3702.1  | 3677.7  | 3666.9  | 3641.9  | 3608.2  | 3548.7  | 3488.5 | 3408.2 |
| 10°   | 3675.6 | 3674.1 | 3671.3 | 3668.4  | 3647.6  | 3639.0  | 3616.1  | 3580.2  | 3521.4  | 3448.3 | 3354.4 |
| 12.5° | 3618.9 | 3622.5 | 3634.0 | 3649.0  | 3639.7  | 3635.4  | 3621.1  | 3596.7  | 3536.5  | 3457.7 | 3344.4 |
| 15°   | 3583.1 | 3593.1 | 3623.9 | 3663.4  | 3671.3  | 3669.8  | 3666.2  | 3650.5  | 3586.7  | 3499.2 | 3367.3 |
| 17.5° | 3570.9 | 3587.4 | 3646.2 | 3711.4  | 3734.3  | 3739.3  | 3740.8  | 3713.5  | 3642.6  | 3550.1 | 3391.0 |
| 20°   | 3593.1 | 3613.9 | 3699.9 | 3789.5  | 3826.1  | 3828.9  | 3822.5  | 3775.2  | 3695.6  | 3593.8 | 3403.9 |
| 22.5° | 3660.5 | 3679.1 | 3786.6 | 3887.7  | 3929.3  | 3933.6  | 3914.2  | 3842.6  | 3751.5  | 3645.4 | 3421.8 |
| 25°   | 3790.2 | 3813.2 | 3920.7 | 4021.7  | 4043.2  | 4044.0  | 4016.0  | 3927.1  | 3824.6  | 3717.8 | 3460.5 |
| 27.5° | 3959.4 | 3982.3 | 4079.1 | 4178.0  | 4166.5  | 4160.1  | 4122.1  | 4033.2  | 3920.0  | 3817.5 | 3529.3 |
| 30°   | 4147.9 | 4173.0 | 4264.7 | 4335.0  | 4307.7  | 4294.8  | 4264.0  | 4149.3  | 4052.6  | 3953.7 | 3634.7 |
| 32.5° | 4342.9 | 4365.8 | 4446.1 | 4494.1  | 4459.7  | 4454.0  | 4407.4  | 4302.7  | 4225.3  | 4161.5 | 3805.3 |
| 35°   | 4542.8 | 4559.3 | 4638.2 | 4665.4  | 4619.5  | 4618.1  | 4605.2  | 4509.1  | 4460.4  | 4490.5 | 4053.3 |
| 37.5° | 4747.1 | 4751.4 | 4818.8 | 4820.2  | 4806.6  | 4812.3  | 4826.0  | 4765.7  | 4779.4  | 4873.3 | 4375.8 |
| 40°   | 4929.2 | 4940.6 | 4989.4 | 5004.4  | 5028.1  | 5048.1  | 5116.2  | 5076.8  | 5182.2  | 5348.5 | 4777.2 |
| 42.5° | 5063.9 | 5086.1 | 5164.3 | 5203.0  | 5279.7  | 5311.2  | 5407.2  | 5443.8  | 5656.0  | 5905.4 | 5254.6 |
| 45°   | 5177.9 | 5212.3 | 5337.7 | 5417.3  | 5547.0  | 5602.2  | 5739.8  | 5862.4  | 6191.4  | 6509.6 | 5757.0 |
| 47.5° | 5301.2 | 5344.9 | 5501.9 | 5653.8  | 5830.1  | 5892.5  | 6142.6  | 6326.1  | 6762.6  | 7117.4 | 6230.8 |
| 50°   | 5482.5 | 5516.2 | 5669.6 | 5908.3  | 6128.3  | 6208.6  | 6554.8  | 6817.8  | 7343.2  | 7696.6 | 6641.5 |
| 52.5° | 5735.5 | 5722.6 | 5852.4 | 6187.1  | 6482.4  | 6581.3  | 6994.9  | 7341.1  | 7931.7  | 8220.5 | 6988.4 |
| 55°   | 5990.0 | 5968.5 | 6059.5 | 6478.8  | 6895.2  | 6999.2  | 7479.4  | 7866.5  | 8491.5  | 8692.2 | 7254.3 |
| 57.5° | 6273.1 | 6232.2 | 6308.9 | 6807.8  | 7365.4  | 7489.4  | 8022.0  | 8424.8  | 9041.9  | 9073.5 | 7423.5 |
| 60°   | 6564.8 | 6509.6 | 6595.6 | 7215.6  | 7962.5  | 8108.7  | 8657.0  | 8969.5  | 9560.9  | 9378.8 | 7478.0 |
| 62.5° | 6820.0 | 6781.3 | 6913.9 | 7670.8  | 8635.5  | 8796.1  | 9280.6  | 9548.7  | 10072.6 | 9505.7 | 7281.6 |
| 65°   | 7042.9 | 7049.3 | 7278.7 | 8182.5  | 9386.0  | 9557.3  | 9995.9  | 10262.6 | 10475.5 | 9430.4 | 6822.1 |
| 67.5° | 7308.8 | 7345.4 | 7736.7 | 8856.3  | 10330.7 | 10518.5 | 11036.7 | 11041.0 | 10700.5 | 8988.9 | 5917.6 |
| 70°   | 7696.6 | 7771.8 | 8366.8 | 9791.0  | 11673.9 | 11931.9 | 12331.9 | 11498.3 | 10384.4 | 7791.9 | 4656.1 |
| 72.5° | 8040.6 | 8181.1 | 9036.9 | 10860.4 | 13311.0 | 13506.6 | 13089.5 | 11234.5 | 9063.4  | 5839.5 | 2900.7 |
| 74°   | 7900.9 | 8075.0 | 9158.8 | 11387.2 | 13927.4 | 14021.3 | 12833.6 | 10464.7 | 7556.8  | 4044.0 | 1685.8 |
| 75°   | 7599.8 | 7789.0 | 8981.0 | 11382.2 | 13849.3 | 13796.9 | 12215.8 | 9585.2  | 6223.6  | 2758.1 | 1121.7 |
| 77.5° | 6133.3 | 6333.3 | 7567.6 | 9755.1  | 11355.6 | 11306.2 | 9383.8  | 6430.1  | 2725.8  | 904.6  | 569.8  |
| 80°   | 3565.9 | 3718.6 | 4697.7 | 6195.0  | 7657.2  | 7746.8  | 6171.3  | 3181.7  | 1072.3  | 508.2  | 386.3  |
| 82.5° | 1584.0 | 1689.4 | 2269.3 | 3162.3  | 4621.0  | 4736.4  | 3231.9  | 1667.2  | 662.3   | 308.9  | 232.2  |
| 85°   | 1039.3 | 1117.4 | 1377.6 | 1505.9  | 2200.5  | 2279.3  | 1581.9  | 1298.1  | 437.2   | 169.9  | 170.6  |
| 87.5° | 747.6  | 822.8  | 1023.5 | 893.8   | 1009.9  | 956.2   | 860.8   | 1201.3  | 175.6   | 96.8   | 57.3   |
| 90°   | 0.0    | 0.0    | 0.0    | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0    | 0.0    |



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CATALOG NUMBER: NVN-SA4B-730-U-SL4

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 3585.2 | 3585.2 | 3585.2 | 3585.2 | 3585.2 | 3585.2 | 3585.2 | 3585.2 | 3585.2 | 3585.2 | 3585.2 |
| 2.5°  | 3551.6 | 3540.1 | 3514.3 | 3465.5 | 3438.3 | 3415.4 | 3377.4 | 3355.2 | 3345.1 | 3344.4 | 3348.7 |
| 5°    | 3463.4 | 3436.9 | 3370.2 | 3288.5 | 3223.3 | 3163.8 | 3090.0 | 3045.5 | 3014.0 | 2995.3 | 3000.4 |
| 7.5°  | 3360.9 | 3319.3 | 3214.7 | 3084.2 | 2979.6 | 2864.2 | 2750.2 | 2682.1 | 2629.1 | 2589.7 | 2596.8 |
| 10°   | 3290.6 | 3233.3 | 3080.6 | 2892.8 | 2718.7 | 2551.0 | 2394.0 | 2300.1 | 2225.5 | 2168.2 | 2172.5 |
| 12.5° | 3267.0 | 3189.6 | 2978.1 | 2727.3 | 2482.9 | 2253.5 | 2048.5 | 1904.4 | 1827.7 | 1762.5 | 1767.5 |
| 15°   | 3270.6 | 3166.7 | 2892.1 | 2578.2 | 2270.7 | 1981.8 | 1733.1 | 1564.7 | 1460.8 | 1415.6 | 1416.3 |
| 17.5° | 3273.4 | 3140.1 | 2801.8 | 2418.4 | 2060.7 | 1728.1 | 1457.9 | 1287.3 | 1189.1 | 1147.5 | 1148.3 |
| 20°   | 3264.1 | 3097.1 | 2690.0 | 2234.9 | 1841.4 | 1495.2 | 1233.5 | 1088.8 | 1014.2 | 982.0  | 982.0  |
| 22.5° | 3251.9 | 3046.2 | 2563.9 | 2050.7 | 1624.9 | 1293.0 | 1073.0 | 962.6  | 919.6  | 898.1  | 897.4  |
| 25°   | 3257.7 | 3008.2 | 2434.8 | 1861.4 | 1425.6 | 1131.8 | 966.2  | 893.1  | 864.4  | 850.8  | 850.1  |
| 27.5° | 3288.5 | 2990.3 | 2315.9 | 1672.9 | 1251.5 | 1010.6 | 894.5  | 842.9  | 824.3  | 815.7  | 815.7  |
| 30°   | 3344.4 | 2990.3 | 2191.9 | 1512.4 | 1106.7 | 921.0  | 839.3  | 804.2  | 791.3  | 785.6  | 785.6  |
| 32.5° | 3441.9 | 3006.8 | 2072.2 | 1353.2 | 991.3  | 850.8  | 793.5  | 769.8  | 759.8  | 756.9  | 756.9  |
| 35°   | 3609.6 | 3062.7 | 1955.3 | 1202.7 | 898.1  | 793.5  | 749.7  | 736.1  | 728.9  | 728.2  | 730.4  |
| 37.5° | 3845.4 | 3176.7 | 1845.7 | 1091.6 | 832.2  | 746.9  | 713.2  | 702.4  | 698.1  | 701.7  | 704.6  |
| 40°   | 4142.2 | 3331.5 | 1746.0 | 991.3  | 782.0  | 709.6  | 679.5  | 672.3  | 670.2  | 675.2  | 679.5  |
| 42.5° | 4500.5 | 3540.8 | 1664.3 | 918.9  | 743.3  | 678.1  | 650.8  | 642.2  | 640.1  | 645.8  | 651.5  |
| 45°   | 4888.3 | 3765.9 | 1607.0 | 865.1  | 713.2  | 654.4  | 625.7  | 616.4  | 612.1  | 615.0  | 621.4  |
| 47.5° | 5241.0 | 3978.7 | 1584.0 | 827.1  | 684.5  | 634.3  | 603.5  | 592.0  | 584.9  | 583.4  | 588.5  |
| 50°   | 5538.4 | 4137.1 | 1594.8 | 804.2  | 661.6  | 612.1  | 582.0  | 569.1  | 558.4  | 551.9  | 555.5  |
| 52.5° | 5754.9 | 4236.8 | 1604.8 | 794.2  | 643.7  | 587.7  | 558.4  | 546.2  | 531.8  | 521.1  | 521.1  |
| 55°   | 5911.8 | 4259.7 | 1582.6 | 786.3  | 630.0  | 561.2  | 531.8  | 520.4  | 506.0  | 493.8  | 492.4  |
| 57.5° | 5973.5 | 4195.2 | 1500.2 | 774.8  | 620.7  | 536.1  | 503.9  | 495.3  | 483.1  | 468.8  | 468.0  |
| 60°   | 5890.3 | 3995.9 | 1341.1 | 750.4  | 608.5  | 515.4  | 475.9  | 470.2  | 464.5  | 450.8  | 450.1  |
| 62.5° | 5556.3 | 3558.7 | 1135.3 | 701.0  | 584.2  | 493.1  | 450.1  | 453.0  | 453.7  | 444.4  | 443.0  |
| 65°   | 4950.7 | 2958.1 | 934.7  | 636.5  | 547.6  | 466.6  | 423.6  | 437.2  | 445.1  | 443.7  | 441.5  |
| 67.5° | 4070.5 | 2302.2 | 792.0  | 568.4  | 499.6  | 430.1  | 394.9  | 410.7  | 417.2  | 422.2  | 420.7  |
| 70°   | 3021.1 | 1623.5 | 655.1  | 496.7  | 441.5  | 387.1  | 357.7  | 365.5  | 361.2  | 367.0  | 369.1  |
| 72.5° | 1684.4 | 974.1  | 534.0  | 425.0  | 381.3  | 336.9  | 316.1  | 314.7  | 305.3  | 305.3  | 305.3  |
| 74°   | 1010.6 | 714.6  | 469.5  | 380.6  | 344.8  | 303.9  | 286.0  | 279.5  | 270.9  | 271.7  | 270.9  |
| 75°   | 812.8  | 614.3  | 430.8  | 351.2  | 319.0  | 284.6  | 266.6  | 258.0  | 251.6  | 251.6  | 250.9  |
| 77.5° | 513.2  | 466.6  | 346.9  | 279.5  | 255.2  | 234.4  | 222.2  | 210.7  | 210.7  | 210.0  | 209.3  |
| 80°   | 387.8  | 371.3  | 270.2  | 211.4  | 195.7  | 179.9  | 172.0  | 167.0  | 167.0  | 169.2  | 168.4  |
| 82.5° | 265.9  | 279.5  | 189.9  | 147.7  | 139.8  | 128.3  | 126.9  | 127.6  | 125.4  | 122.6  | 121.8  |
| 85°   | 194.2  | 210.0  | 128.3  | 93.2   | 85.3   | 78.1   | 83.9   | 86.7   | 83.1   | 76.7   | 73.8   |
| 87.5° | 74.5   | 137.6  | 68.8   | 38.7   | 35.8   | 30.8   | 35.8   | 37.3   | 40.1   | 31.5   | 32.3   |
| 90°   | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |

LM-79-2008: Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products

Report Prepared for

Cooper Lighting Solutions

McGRAW-EDISON

Report Number: SP1-1908-441-2-R4

Test Date: 10/03/2019

Luminaire Tested: SA1C-730-U-5WQ

Data in this report applies to families of products SA1C-730-U-5WQ .

### Test Information

Test Method: LM-79-2008  
Report Number: SP1-1908-441-2-R4  
Test Lab: COOPER LIGHTING SOLUTIONS  
Photometer: SP1 - 76IN SPHERE  
Measurement Geometry:  $4\pi$   
Issue Date: 10/28/2024  
Manufacturer: COOPER LIGHTING SOLUTIONS  
Product Line: MCGRAW-EDISON  
Catalog Number: **SA1C-730-U-5WQ**  
Description: MCGRAW EDISON ROADWAY AND AREA LUMINAIRE

\*\*\*THIS IS A REVISION OF SP1-1908-441-2-R3. TO UPDATE THE CATALOG INFORMATION.\*\*\*TESTED IN SITU. (1) 70 CRI, 3000K, 1050MA LIGHTSQUARE WITH 16 LEDS AND TYPE V WIDE OPTICS.

### Spectral Parameters

|                           |        |           |      |      |       |
|---------------------------|--------|-----------|------|------|-------|
| CCT (K):                  | 2993   | CRI (Ra): | 71.8 |      |       |
| CIE u':                   | 0.2508 | R1:       | 67.5 | R9:  | -38.3 |
| CIE v':                   | 0.5215 | R2:       | 82.9 | R10: | 62.5  |
| Duv:                      | 0.0000 | R3:       | 94.7 | R11: | 63.7  |
| CIE x:                    | 0.4374 | R4:       | 67.7 | R12: | 57.8  |
| CIE y:                    | 0.4043 | R5:       | 67.9 | R13: | 70.4  |
| CIE z:                    | 0.1583 | R6:       | 77.6 | R14: | 97.3  |
| Peak Wavelength (nm):     | 593    | R7:       | 76.0 |      |       |
| Dominant Wavelength (nm): | 582    | R8:       | 40.5 |      |       |
| Purity:                   | 53     |           |      |      |       |
| Rf:                       | 75.7   |           |      |      |       |
| Rg:                       | 93.9   |           |      |      |       |



### Test Conditions

Stabilization Time: 53M  
Operation Time: 12H  
Room Temperature (°C) / RH%: 25.0./44%  
Sphere Temperature (°C): 25.7

REPORT NUMBER: SP1-1908-441-2-R4

| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| Photometer                     | IN0058                | 6/28/2019        | 12/28/2019           |
| Power Meter                    | IN0071                | 12/5/2018        | 12/5/2019            |
| AC Power Source                | IN0063                | 12/5/2018        | 12/5/2019            |
| DC Power Source                | IN0208                | 12/5/2018        | 12/5/2019            |
| Sphere Thermometer             | IN0085                | 12/5/2018        | 12/5/2019            |
| Room Thermometer               | IN0046                | 12/5/2018        | 12/5/2019            |

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**CIE 1931 Chromaticity Diagram**



**CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles**



Point lies inside the ANSI 3000K 4-step quadrangle

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**Photopic Flux vs. Wavelength**



#####

| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 2397             | NR               | 490       | 24908            | NR               | 620       | 118784           | NR               | 750       | 5037             | NR               | 880       | 2677             | NR               |
| 365       | 2084             | NR               | 495       | 30998            | NR               | 625       | 108951           | NR               | 755       | 4413             | NR               | 885       | 2940             | NR               |
| 370       | 2143             | NR               | 500       | 37103            | NR               | 630       | 99573            | NR               | 760       | 4189             | NR               | 890       | 3116             | NR               |
| 375       | 2413             | NR               | 505       | 42987            | NR               | 635       | 90444            | NR               | 765       | 3677             | NR               | 895       | 3345             | NR               |
| 380       | 2172             | NR               | 510       | 48702            | NR               | 640       | 80749            | NR               | 770       | 3366             | NR               | 900       | 2312             | NR               |
| 385       | 1997             | NR               | 515       | 53741            | NR               | 645       | 71664            | NR               | 775       | 3211             | NR               | 905       | 2829             | NR               |
| 390       | 1830             | NR               | 520       | 57283            | NR               | 650       | 63936            | NR               | 780       | 2682             | NR               | 910       | 2783             | NR               |
| 395       | 1861             | NR               | 525       | 61876            | NR               | 655       | 56611            | NR               | 785       | 2804             | NR               | 915       | 2662             | NR               |
| 400       | 1717             | NR               | 530       | 65398            | NR               | 660       | 49763            | NR               | 790       | 2581             | NR               | 920       | 3047             | NR               |
| 405       | 1761             | NR               | 535       | 69597            | NR               | 665       | 42891            | NR               | 795       | 2711             | NR               | 925       | 2256             | NR               |
| 410       | 2680             | NR               | 540       | 74214            | NR               | 670       | 36939            | NR               | 800       | 2609             | NR               | 930       | 2976             | NR               |
| 415       | 4374             | NR               | 545       | 79911            | NR               | 675       | 31946            | NR               | 805       | 2581             | NR               | 935       | 3503             | NR               |
| 420       | 8071             | NR               | 550       | 86153            | NR               | 680       | 27385            | NR               | 810       | 2404             | NR               | 940       | 4226             | NR               |
| 425       | 15169            | NR               | 555       | 93952            | NR               | 685       | 23504            | NR               | 815       | 2556             | NR               | 945       | 2930             | NR               |
| 430       | 26038            | NR               | 560       | 102904           | NR               | 690       | 20210            | NR               | 820       | 2742             | NR               | 950       | 2115             | NR               |
| 435       | 41316            | NR               | 565       | 112009           | NR               | 695       | 17459            | NR               | 825       | 2014             | NR               | 955       | 2634             | NR               |
| 440       | 59674            | NR               | 570       | 121662           | NR               | 700       | 15207            | NR               | 830       | 2488             | NR               | 960       | 4200             | NR               |
| 445       | 72751            | NR               | 575       | 130476           | NR               | 705       | 13322            | NR               | 835       | 2625             | NR               | 965       | 1982             | NR               |
| 450       | 65091            | NR               | 580       | 137926           | NR               | 710       | 11676            | NR               | 840       | 2754             | NR               | 970       | 3613             | NR               |
| 455       | 44894            | NR               | 585       | 143406           | NR               | 715       | 10626            | NR               | 845       | 2708             | NR               | 975       | 4034             | NR               |
| 460       | 32712            | NR               | 590       | 147039           | NR               | 720       | 9416             | NR               | 850       | 2608             | NR               | 980       | 3922             | NR               |
| 465       | 25296            | NR               | 595       | 147365           | NR               | 725       | 8333             | NR               | 855       | 2605             | NR               | 985       | 1909             | NR               |
| 470       | 19318            | NR               | 600       | 145800           | NR               | 730       | 7134             | NR               | 860       | 1765             | NR               | 990       | 3617             | NR               |
| 475       | 17265            | NR               | 605       | 141363           | NR               | 735       | 6437             | NR               | 865       | 2581             | NR               | 995       | 4767             | NR               |
| 480       | 18260            | NR               | 610       | 134199           | NR               | 740       | 5834             | NR               | 870       | 3016             | NR               | 1000      | 2528             | NR               |
| 485       | 20845            | NR               | 615       | 127683           | NR               | 745       | 5500             | NR               | 875       | 3952             | NR               |           |                  |                  |

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Scotopic Flux vs. Wavelength



Scotopic Lumens: 8494.8

S/P: 1.23

| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 2397             | NR               | 490       | 24908            | NR               | 620       | 118784           | NR               | 750       | 5037             | NR               | 880       | 2677             | NR               |
| 365       | 2084             | NR               | 495       | 30998            | NR               | 625       | 108951           | NR               | 755       | 4413             | NR               | 885       | 2940             | NR               |
| 370       | 2143             | NR               | 500       | 37103            | NR               | 630       | 99573            | NR               | 760       | 4189             | NR               | 890       | 3116             | NR               |
| 375       | 2413             | NR               | 505       | 42987            | NR               | 635       | 90444            | NR               | 765       | 3677             | NR               | 895       | 3345             | NR               |
| 380       | 2172             | NR               | 510       | 48702            | NR               | 640       | 80749            | NR               | 770       | 3366             | NR               | 900       | 2312             | NR               |
| 385       | 1997             | NR               | 515       | 53741            | NR               | 645       | 71664            | NR               | 775       | 3211             | NR               | 905       | 2829             | NR               |
| 390       | 1830             | NR               | 520       | 57283            | NR               | 650       | 63936            | NR               | 780       | 2682             | NR               | 910       | 2783             | NR               |
| 395       | 1861             | NR               | 525       | 61876            | NR               | 655       | 56611            | NR               | 785       | 2804             | NR               | 915       | 2662             | NR               |
| 400       | 1717             | NR               | 530       | 65398            | NR               | 660       | 49763            | NR               | 790       | 2581             | NR               | 920       | 3047             | NR               |
| 405       | 1761             | NR               | 535       | 69597            | NR               | 665       | 42891            | NR               | 795       | 2711             | NR               | 925       | 2256             | NR               |
| 410       | 2680             | NR               | 540       | 74214            | NR               | 670       | 36939            | NR               | 800       | 2609             | NR               | 930       | 2976             | NR               |
| 415       | 4374             | NR               | 545       | 79911            | NR               | 675       | 31946            | NR               | 805       | 2581             | NR               | 935       | 3503             | NR               |
| 420       | 8071             | NR               | 550       | 86153            | NR               | 680       | 27385            | NR               | 810       | 2404             | NR               | 940       | 4226             | NR               |
| 425       | 15169            | NR               | 555       | 93952            | NR               | 685       | 23504            | NR               | 815       | 2556             | NR               | 945       | 2930             | NR               |
| 430       | 26038            | NR               | 560       | 102904           | NR               | 690       | 20210            | NR               | 820       | 2742             | NR               | 950       | 2115             | NR               |
| 435       | 41316            | NR               | 565       | 112009           | NR               | 695       | 17459            | NR               | 825       | 2014             | NR               | 955       | 2634             | NR               |
| 440       | 59674            | NR               | 570       | 121662           | NR               | 700       | 15207            | NR               | 830       | 2488             | NR               | 960       | 4200             | NR               |
| 445       | 72751            | NR               | 575       | 130476           | NR               | 705       | 13322            | NR               | 835       | 2625             | NR               | 965       | 1982             | NR               |
| 450       | 65091            | NR               | 580       | 137926           | NR               | 710       | 11676            | NR               | 840       | 2754             | NR               | 970       | 3613             | NR               |
| 455       | 44894            | NR               | 585       | 143406           | NR               | 715       | 10626            | NR               | 845       | 2708             | NR               | 975       | 4034             | NR               |
| 460       | 32712            | NR               | 590       | 147039           | NR               | 720       | 9416             | NR               | 850       | 2608             | NR               | 980       | 3922             | NR               |
| 465       | 25296            | NR               | 595       | 147365           | NR               | 725       | 8333             | NR               | 855       | 2605             | NR               | 985       | 1909             | NR               |
| 470       | 19318            | NR               | 600       | 145800           | NR               | 730       | 7134             | NR               | 860       | 1765             | NR               | 990       | 3617             | NR               |
| 475       | 17265            | NR               | 605       | 141363           | NR               | 735       | 6437             | NR               | 865       | 2581             | NR               | 995       | 4767             | NR               |
| 480       | 18260            | NR               | 610       | 134199           | NR               | 740       | 5834             | NR               | 870       | 3016             | NR               | 1000      | 2528             | NR               |
| 485       | 20845            | NR               | 615       | 127683           | NR               | 745       | 5500             | NR               | 875       | 3952             | NR               |           |                  |                  |

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**Melanopic Flux vs. Wavelength**



**Melanopic Lumens: 3101.5 M/P: 0.45**

| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 2397             | NR               | 490       | 24908            | NR               | 620       | 118784           | NR               | 750       | 5037             | NR               | 880       | 2677             | NR               |
| 365       | 2084             | NR               | 495       | 30998            | NR               | 625       | 108951           | NR               | 755       | 4413             | NR               | 885       | 2940             | NR               |
| 370       | 2143             | NR               | 500       | 37103            | NR               | 630       | 99573            | NR               | 760       | 4189             | NR               | 890       | 3116             | NR               |
| 375       | 2413             | NR               | 505       | 42987            | NR               | 635       | 90444            | NR               | 765       | 3677             | NR               | 895       | 3345             | NR               |
| 380       | 2172             | NR               | 510       | 48702            | NR               | 640       | 80749            | NR               | 770       | 3366             | NR               | 900       | 2312             | NR               |
| 385       | 1997             | NR               | 515       | 53741            | NR               | 645       | 71664            | NR               | 775       | 3211             | NR               | 905       | 2829             | NR               |
| 390       | 1830             | NR               | 520       | 57283            | NR               | 650       | 63936            | NR               | 780       | 2682             | NR               | 910       | 2783             | NR               |
| 395       | 1861             | NR               | 525       | 61876            | NR               | 655       | 56611            | NR               | 785       | 2804             | NR               | 915       | 2662             | NR               |
| 400       | 1717             | NR               | 530       | 65398            | NR               | 660       | 49763            | NR               | 790       | 2581             | NR               | 920       | 3047             | NR               |
| 405       | 1761             | NR               | 535       | 69597            | NR               | 665       | 42891            | NR               | 795       | 2711             | NR               | 925       | 2256             | NR               |
| 410       | 2680             | NR               | 540       | 74214            | NR               | 670       | 36939            | NR               | 800       | 2609             | NR               | 930       | 2976             | NR               |
| 415       | 4374             | NR               | 545       | 79911            | NR               | 675       | 31946            | NR               | 805       | 2581             | NR               | 935       | 3503             | NR               |
| 420       | 8071             | NR               | 550       | 86153            | NR               | 680       | 27385            | NR               | 810       | 2404             | NR               | 940       | 4226             | NR               |
| 425       | 15169            | NR               | 555       | 93952            | NR               | 685       | 23504            | NR               | 815       | 2556             | NR               | 945       | 2930             | NR               |
| 430       | 26038            | NR               | 560       | 102904           | NR               | 690       | 20210            | NR               | 820       | 2742             | NR               | 950       | 2115             | NR               |
| 435       | 41316            | NR               | 565       | 112009           | NR               | 695       | 17459            | NR               | 825       | 2014             | NR               | 955       | 2634             | NR               |
| 440       | 59674            | NR               | 570       | 121662           | NR               | 700       | 15207            | NR               | 830       | 2488             | NR               | 960       | 4200             | NR               |
| 445       | 72751            | NR               | 575       | 130476           | NR               | 705       | 13322            | NR               | 835       | 2625             | NR               | 965       | 1982             | NR               |
| 450       | 65091            | NR               | 580       | 137926           | NR               | 710       | 11676            | NR               | 840       | 2754             | NR               | 970       | 3613             | NR               |
| 455       | 44894            | NR               | 585       | 143406           | NR               | 715       | 10626            | NR               | 845       | 2708             | NR               | 975       | 4034             | NR               |
| 460       | 32712            | NR               | 590       | 147039           | NR               | 720       | 9416             | NR               | 850       | 2608             | NR               | 980       | 3922             | NR               |
| 465       | 25296            | NR               | 595       | 147365           | NR               | 725       | 8333             | NR               | 855       | 2605             | NR               | 985       | 1909             | NR               |
| 470       | 19318            | NR               | 600       | 145800           | NR               | 730       | 7134             | NR               | 860       | 1765             | NR               | 990       | 3617             | NR               |
| 475       | 17265            | NR               | 605       | 141363           | NR               | 735       | 6437             | NR               | 865       | 2581             | NR               | 995       | 4767             | NR               |
| 480       | 18260            | NR               | 610       | 134199           | NR               | 740       | 5834             | NR               | 870       | 3016             | NR               | 1000      | 2528             | NR               |
| 485       | 20845            | NR               | 615       | 127683           | NR               | 745       | 5500             | NR               | 875       | 3952             | NR               |           |                  |                  |

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**Summary**

$R_f = 75.7$   
 $R_g = 93.9$   
 CIE  $R_a = 71.8$   
 $R_g = -38.3$



**Color Vector Graphics**



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**Individual Sample Fidelity Index ( $R_{f,i}$ )**

|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 67 | CES51 = 87 | CES76 = 63 |
| CES02 = 63 | CES27 = 88 | CES52 = 86 | CES77 = 80 |
| CES03 = 31 | CES28 = 87 | CES53 = 78 | CES78 = 67 |
| CES04 = 71 | CES29 = 66 | CES54 = 84 | CES79 = 87 |
| CES05 = 49 | CES30 = 73 | CES55 = 84 | CES80 = 86 |
| CES06 = 51 | CES31 = 70 | CES56 = 75 | CES81 = 71 |
| CES07 = 41 | CES32 = 65 | CES57 = 74 | CES82 = 94 |
| CES08 = 40 | CES33 = 73 | CES58 = 76 | CES83 = 90 |
| CES09 = 29 | CES34 = 79 | CES59 = 85 | CES84 = 89 |
| CES10 = 76 | CES35 = 89 | CES60 = 93 | CES85 = 77 |
| CES11 = 59 | CES36 = 97 | CES61 = 84 | CES86 = 61 |
| CES12 = 65 | CES37 = 87 | CES62 = 91 | CES87 = 78 |
| CES13 = 43 | CES38 = 81 | CES63 = 77 | CES88 = 77 |
| CES14 = 74 | CES39 = 95 | CES64 = 72 | CES89 = 67 |
| CES15 = 71 | CES40 = 92 | CES65 = 68 | CES90 = 76 |
| CES16 = 47 | CES41 = 88 | CES66 = 69 | CES91 = 89 |
| CES17 = 50 | CES42 = 89 | CES67 = 67 | CES92 = 58 |
| CES18 = 56 | CES43 = 79 | CES68 = 72 | CES93 = 74 |
| CES19 = 73 | CES44 = 99 | CES69 = 81 | CES94 = 49 |
| CES20 = 66 | CES45 = 85 | CES70 = 66 | CES95 = 68 |
| CES21 = 87 | CES46 = 80 | CES71 = 67 | CES96 = 76 |
| CES22 = 79 | CES47 = 82 | CES72 = 88 | CES97 = 82 |
| CES23 = 92 | CES48 = 69 | CES73 = 59 | CES98 = 75 |
| CES24 = 91 | CES49 = 80 | CES74 = 95 | CES99 = 62 |
| CES25 = 73 | CES50 = 87 | CES75 = 69 |            |



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**Color Rendition by Hue-Angle Bin**



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**Measure Comparisons**



(END OF REPORT)